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THE SCIENTIFIC PREVENTION OF YELLOW FEVER.

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NEW YORK.

THE appearance of yellow fever among the United States troops in Cuba during the past summer and the recent outbreak in the South, combined with the published investigations of Prof. Sanarelli and others as to the specific micro-organism of yellow fever, have again brought this disease prominently before the public. The increased importance of the subject will doubtless be an incentive to Congress to renew the discussion begun at the last session in regard to the establishment of a national department of health. The consideration, on the part of Congress and the people of the South, of the subject of yellow fever and of the methods required for its suppression, has extended over a long period; and that the public is patient and long suffering is evident from the tolerance which has been shown toward this continued discussion. For years, more or less friction has existed between the health authorities of Southern towns, cities and States, and between the authorities of these States and the Federal Government, and to a certain extent these differences still continue. Therefore, the appearance of a case of yellow fever in one of the Southern States is not always the signal for combined and harmonious action to prevent the extension of the disease.

Competent and conscientious Southern health officials are frequently unjustly censured at these times, and there is often a public clamor for some change in the management of the outbreak; this at least indicates a lack of confidence on the part of the people. The disastrous effect on commerce and on travel of the quarantine measures which immediately follow an outbreak of

the disease, and which range from the primitive "shot-gun" quarantine, to the proper measures enforced by duly authorized health officials, is only too well known. The periods during which the outbreaks occur are usually prolific in the creation of bills, the destination of which is Congress. It is firmly believed by the supporters of these measures that they have at last found a remedy for the evil; but the fact that almost all of them differ materially in their provisions, is a sufficient proof that those who present them are not of one mind as to the proper procedures in preventing the introduction or extension of yellow fever.

A careful investigation shows that quarantine, as a means of controlling the outbreaks referred to, has not been as successful as we could wish, although carried out in a most rigid manner, varying somewhat in form, however, in the different States and municipalities. To those who have depended upon quarantine alone, the outlook is not particularly hopeful. Therefore, we are stimulated to look for some other means of securing the desired result.

In order to study this subject intelligently we must be familiar with the cause of the disease and the manner in which it is propagated. We know that yellow fever is due to a specific germ, which multiplies in the human system and produces the characteristic symptoms of the disease; that this micro-organism may infect a town or circumscribed area, provided certain climatic and local conditions are present, and that those exposed to the infected locality are liable to contract the disease. Yellow fever is not contagious in the strict sense; that is, it is not communicated from persons to persons, as is smallpox or scarlet fever. Those outside of an infected locality do not contract the disease, even when brought into close and prolonged contact with persons suffering from it. Therefore, outside of the infected locality or zone (that is, those regions which furnish the climatic conditions necessary for its propagation) the disease is harmless. In corroboration of this, I cite the following resolution, passed by a most notable assemblage of sanitarians, the Third National and Sanitary Convention, held in New York, in 1859:

"Resolved, That in the absence of any evidence establishing the conclusion that yellow fever has ever been conveyed by one person to another, it is the opinion of this convention that the personal quarantine of cases may be safely abolished, provided tomits of every kind be rigidly restricted."

In order that the specific micro-organism of this disease shall thrive outside of the human body, certain climatic and local conditions are essential.

The climatic conditions are not all clearly defined. It is known, however, that there must be a long continued high temperature, with more or less moisture and a low country. Yellow fever rarely extends above an altitude of 1,000 feet. Although there may be some doubt as to what are the climatic conditions necessary to propagate the disease, there is no difference of opinion as to what are the local requirements. I refer to filth and defective drainage. There is no city in the world to-day where yellow fever is epidemic which does not afford substantial proof of this fact. The same conditions, perhaps to a less extent, are found to exist in those sections where yellow fever occasionally prevails. The specific organism of yellow fever, like that of the bubonic plague, is nourished and kept alive by decomposing organic matter. If supplied with plenty of food in the shape of filth, the germ of yellow fever will thrive in spite of quarantine. If starved by cleanliness, its development is stopped. Dr. Parke, the eminent English sanitarian, speaks of yellow fever as being often singularly localized, and he refers to repeated outbreaks occurring in barracks at Bermuda, Trinidad, Barbadoes and Jamaica, while no other places on these islands were affected. In the same way, at Lisbon, Cadiz, and many other cities, it has attacked only one section of a town. Dr. Hardie, an American physician, writing in the early part of this century, says: "Yellow fever is not contagious in pure air." La Roche, in his classical work on yellow fever, strongly asserts the non-contagiousness, as well as the locally infectious character, of this disease. Dr. Reynolds, in concluding an article on this subject, says: "A survey of the whole history of the disease leaves it still to be concluded that, at the most, contagion is to be admitted as a merely possible supposition, extremely hard even for its advocates to trace with certainty in any definite instance, while the geographical relation of the disease and its promotion by local unsanitary conditions are palpable and overwhelmingly important." Were it necessary, I might add similar testimony from others who have carefully studied this subject from a practical standpoint, to prove the power of filth as a factor in the propagation of yellow fever. The importance of this fact has not been properly considered in the delib-

eration of bodies brought together to formulate rules and regulations for the protection of the South against the invasion of this disease.

We know that yellow fever under certain aggravated conditions may extend in a territory outside of the yellow fever belt. The conditions referred to consist of bad drainage and filth, whereas the disease rarely affects the out-of-town territory where pure air exists, even within the yellow fever zone. On this point Dr. George M. Sternberg, Surgeon General of the United States Army, speaks emphatically as follows:

“When yellow fever prevails as an epidemic, physicians and nurses are apt to contract the disease, because they are necessarily exposed in the infected localities, not because they come in contact with the sick. . . . During the season favorable for the epidemic prevalence of the disease, its propagation without doubt depends largely upon local insanitary conditions, and it is doubtful whether it could effect a lodgment in a clean and well paved city. . . . In Havana, Rio de Janeiro and other endemic foci of the disease, it is especially prevalent in low lying, filthy districts with unpaved streets.”

My personal observations in Havana and Vera Cruz fully confirm what Dr. Sternberg says. In the report of Dr. Hardie describing the outbreak of yellow fever in New York between 1798 and 1805, he clearly and unmistakably shows that the disease was confined to a locality about Front street and Coenties and New Slips, which was at that time notorious for its filthy and unsanitary condition, and that, after this section had been properly drained and placed in good sanitary condition, the disease entirely disappeared. With this mass of evidence before us based on experience, we must regard filth and bad sanitation as the local conditions which favor the propagation of yellow fever. A realization of this is being shown in countries where yellow fever is endemic, and among people who are not so far advanced in sanitary science as we are. I will refer, for example, to Santos, a seacoast town of Brazil. Until recent years, the mortality from yellow fever in that place has been very large, the drainage primitive and defective, and the sanitary condition particularly bad. Mainly through the enterprise of engineers from this country, a new system of sewerage has been recently introduced which has resulted in a marked reduction in the number of cases of yellow fever. The cause of this is fully apparent to the inhabitants of the town, who now co-operate with the health officials in

enforcing the sanitary regulations which are necessary for the protection of the public health. Memphis in our own country has had a bitter experience, and now knows full well the value of good drainage and cleanliness.

With a keen appreciation of what has just been stated, it does not seem reasonable that quarantine alone can be depended upon to prevent the introduction or extension of yellow fever. Quarantine has important functions. Its value, however, is greatest at the seacoast, or ports of entry. An infected ship may be kept under close observation, and the infection destroyed by disinfection, but a land quarantine can always be evaded. It should not surprise us, therefore, or reflect unpleasantly upon a health official, if an outbreak of yellow fever in the South is followed by an extension of the disease to other points where the local conditions are favorable to it.

New Orleans and other Southern cities, which are frequently visited by yellow fever, are not, strictly speaking, in a good sanitary condition. The lowness of the land upon which New Orleans is built, in its relation to the Mississippi, makes the ordinary modern sewerage system impossible, inasmuch as the proper fall cannot be secured for the main sewers, which, under ordinary circumstances, discharge into an adjoining waterway. The streets in this and other Southern cities, or at least some parts of them, are imperfectly paved and graded, and are not properly sewer connected. The health officials of these towns realize that these conditions are a menace to the public health, and in many instances have been industrious in their efforts to obtain appropriations large enough to secure proper sanitary conditions. The results, however, have been discouraging, inasmuch as funds sufficient for the purpose cannot be obtained. It is apparent, therefore, that the Southern people do not yet fully appreciate the imperative necessity of having the best and most modern sanitary appliances, good drainage and clean streets. If the agitation in the South, which is always present during an outbreak of yellow fever, could be turned in this direction, I have no doubt as to the good results which would follow. The lay members of a community are not expected to make a study of this or any other disease, and it is necessary that they should be made acquainted with the important facts bearing upon the subject.

I feel certain that, if the streets of the Southern cities within

the yellow fever zone were to be properly paved, or made smooth, graded and well cleaned and drained, if new and improved sewerage systems were introduced and every precaution taken to insure strict cleanliness, that yellow fever would practically make no headway, and the terror which the appearance of a case of this disease now inspires would be a thing of the past. To the public it would be educational, inasmuch as it would require individual co-operation to keep the different towns in a good sanitary condition. Opposition on the part of the public or press toward any health ordinance makes its enforcement extremely difficult.

Assuming that the improvement which I have suggested would involve considerable expense, it would be exceedingly small compared with the loss involved by the destruction of commerce and transportation which always follows the establishment of a rigid inland quarantine in the South. I am satisfied that in no other way will the South ever be freed from the danger, both to life and commerce, which an outbreak of yellow fever now carries with it. I have no desire to belittle the importance of a sensible and thorough quarantine, but it is not a radical measure, and, after its removal, the locality involved is just as susceptible to the disease as ever. I refer more particularly to the quarantine methods which are in force in the interior.

It now remains to consider from what source comes the yellow fever infection, which from time to time is introduced into the South. A careful investigation cannot always decide this question, but, although infection may be brought from South American ports, it is safe to assume that in some way it generally emanates from Cuba. No other place in the world to-day offers such a menace to the public health of this country as the Cuban seaports, notably Havana. The close proximity of that city to the United States, combined with the fact that it is one of the filthiest cities in existence and the home of yellow fever throughout the year, makes it at present a very undesirable neighbor. Here also the remedy is very simple, and, if carried out, would transform into a healthy and beautiful city a sickly town reeking with filth, having badly paved streets and suffering from an entire absence of a modern and effective sewerage system. In Havana may be seen the degradation of sanitary science. I have never met in that city a public health official who seemed to have any conception of what is necessary to insure even a fair sanitary con-

dition. Any rules and regulations which may have been promulgated from time to time for the ostensible purpose of protecting the public health, have proved worse than useless. The streets in some sections of the city are almost impassable from the filth which covers them, and which rapidly decomposes and furnishes rich nourishment for the germs of yellow fever and every other disease which thrives on the product of uncleanness. Certain areas in the city are practically cesspools, and the soil and woodwork about the water front and docks could not be more filthy. Thus we have in Havana every requisite in an exaggerated form for the growth of the yellow fever germ and for the extension of the disease. It would seem that now, when the Government of the United States has its hand upon Cuba, the time is propitious for insisting upon radical changes in the sanitary arrangements of Havana and other Cuban towns which are in direct and constant communication with the United States.

The placing of United States sanitary officials at Havana and other Cuban ports, to warn outgoing vessels of the danger which they are leaving and to inform quarantine and health officials at the United States ports of the number of cases of yellow fever which exist in Havana and elsewhere in Cuba, and the issuing of certificates to those who are immune, are undoubtedly valuable provisions. They serve as an aid to quarantine officers in dealing with incoming vessels, but they are entirely superficial, and do not deal directly with the causes which have made Havana and other Cuban ports such a menace to the Southern States, neither will the strictest sanitary regulations which may be imposed upon vessels and persons leaving Havana, or entering the United States, remove the danger. At present, commerce between Cuba and the United States is greatly fettered by sanitary regulations, both upon leaving Cuban ports and again upon reaching our shores. These have become almost unbearable. No permanent improvement in the sanitary condition of Cuba will be apparent until its seaports are subjected to a complete overhauling, and until every vestige of the old and defective sewers of every description, and all the filthy and infected woodwork of the docks along the water front are removed, and new and modern systems of sewerage are substituted. The streets should be paved and graded, in order that the surface water and filth can find an easy exit. All vaults and cesspools, which always constitute a menace to

the public health, must be cleaned, disinfected and filled up, or properly sewer connected. It is essential that the streets should be flushed with water at frequent intervals, in order that all filth and organic matter may be frequently removed. When this is done and proper sanitary rules and regulations are made and observed, then, and only then, will the Cuban towns cease to be a menace to this country. When the solution of the problem is so very easy, and we have at our command means of placing the South in such a position that it need not again fear such formidable epidemics of yellow fever as have visited it in the past, and with the opportunity of securing the co-operation and confidence of the Southern people instead of their antagonism in matters pertaining to the public health, and when the means are before us of making it not only probable but certain that Havana and other seaport towns of Cuba can be placed in good sanitary condition and the danger from yellow fever reduced to the minimum, it can hardly be understood why the importance of cleanliness and proper drainage has not received the consideration to which it is entitled. This seems the more unintelligible, as writers upon the subject of yellow fever have for the past century followed but one text, viz., filth and bad sanitary conditions are essential to the spread of yellow fever. Yet we disregard this, and seek to find some means of making quarantine—which in some instances has richly earned the appellation of “commerce destroyer”—more rigid and exacting.

Quarantine is necessary and cannot be dispensed with, particularly when used with its most powerful ally, scientific and thorough disinfection; but quarantine should be used as an adjunct to cleanliness and proper sanitary conditions, instead of replacing them. Communities as a rule reluctantly admit that they harbor bad sanitary conditions, and they are slow to make improvements in this direction, even if the money necessary for the purpose is available. It is this reluctance which must be overcome, before success is attained in our effort to prevent the introduction and spread of yellow fever.

It is remarkable how completely the fear of yellow fever has saturated the minds of the people of the United States, especially as our knowledge of the disease does not justify it. As already shown, yellow fever is not contracted by personal contact, and outside of the yellow fever zone is not a menace to the public

health at any season, provided ordinary sanitary conditions are observed. Cold weather stops the propagation of the disease, either within or without the yellow fever zone, and even within it during the summer months strict sanitary regulations reduce to a minimum the danger.

The fear of yellow fever among the people has almost entirely obscured the danger from diphtheria, tuberculosis and typhoid fever, and other infectious diseases which confront us at all times and during all seasons. The danger from a case of diphtheria in New York at any season of the year is far greater than the danger from a case of yellow fever in the same place; still, persons who would shun a street where a case of yellow fever existed would deliberately enter the apartment of a person suffering from diphtheria. A serious outbreak of typhoid fever creates but little consternation, and the presence in our midst of innumerable cases of tuberculosis, a disease which is responsible for an incredible number of deaths, is looked upon with indifference by the public. This misconception in regard to the danger from this class of diseases often renders the efforts of health officials ineffectual.

For a long time sanitarians and others, who have fully appreciated the importance of taking such action as would bring tuberculosis, typhoid fever, etc., more under the control of health authorities, have endeavored to secure the establishment of a national health bureau or department, which shall not only have general supervision over quarantine matters, but shall also have jurisdiction over sanitary matters in the interior, which is even more important. This feeling has found expression in a bill introduced in the United States Senate last winter by the Hon. John C. Spooner. It is the intent of this bill to establish a department which shall be sufficiently broad in its scope to have general supervision over health matters throughout the United States, both at the coast and in the interior. It is not its aim to obstruct or interfere with local health officials in the proper performance of their duties, but to assist and co-operate with them, and to harmonize their action; and to instruct and thus gain the confidence of the public. No one conversant with the subject can fail to see the value of such a department, and there is reason to believe that during the next session of Congress the bill referred to will again receive serious and proper consideration.

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